# SUPPLEMENT.

# The Mining Journal,

## RAILWAY AND COMMERCIAL GAZETTE:

**FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.**

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## Original Correspondence.

### COLLIERIES IN NORTHUMBERLAND, THEIR WORKINGS AND MACHINERY—No. XII.

WALBOTTLE COLLIERY, WITH HISTORICAL ACCOUNT OF NEIGHBOURING COLLIERIES.—The Walbottle mineral property is leased by Messrs. Lamb from the Duke of Northumberland and others; Mr. T. S. Hurst being the colliery viewer. The area under lease is about 3560 acres. Walbottle and its neighbourhood possess great historic interest from the fact of the Roman wall passing through the property (a brief description of which is hereafter given). It is known that the Romans made use of coal, for ashes are found at most of the stations on the wall, and stores of coal at some of them; and the tools used for coal getting have been found at various places. Coal is supposed to have been got by them about the year 400, in a pit at Benwell. In the year 1239 Henry III. granted a charter to the townsmen of Newcastle to dig coal and stone in the Castle Fields and the Forth. Ancient records show that in 1367 coal was sent from Winlaton for the use of the Clerk of Works at Windsor Castle, but this coal was chiefly got by adits and levels. In the year 1529 Cardinal Wolsey, then Bishop of Durham, was in receipt of one chaldron of coals daily out of each coal mine within the domains of Gateshead and Whickham. In 1582 Queen Elizabeth obtained a lease, called the Grand Lease, of the manors and royalties of Gateshead and Whickham, for 99 years, at a rental of 90*l.* per year. These were transferred to the Earl of Leicester, afterwards assigned to Sir Thomas Sutton, and ultimately purchased by the mayor and burgesses of Newcastle for 12,000*l.* In 1602 there were engaged in the Newcastle coal trade 28 acting fitters or hostmen, who provided 85 keels for the vending of 9080 tons of coal in that year. About this time the impost on coals from the Tyne, called the Richmond shilling, commenced, in lieu of arrears of duty on oversea coal. This charge was continued up to March 1, 1831. It is found difficult to determine the date of the first working of coal on Walbottle property, but as there are a great number of abandoned pits on the southern portion of it bordering on the River Tyne, it is probable that coal has been worked here during the last 300 years in considerable quantities, when we consider that the depth to the best household coal, the Engine seam, was slight (other seams may have been got by adits at an earlier period), and rare facilities for sending coals away by keels were close at hand.

Walbottle Colliery is bounded on the west by the colliery properties of Throckley and Callerton, on the north and east by Kenton and Benwell, and on the south by the River Tyne and Stella Colliery. The coal that has been worked during the last sixty years has been raised chiefly at three pits—viz., the Duke Pit, the Blucher Pit, and the Coronation Pit. The latter, and the Clay Pit only are now in operation. From the existence of extensive old workings of seams which crop out to the surface near the north and western boundary of Walbottle, there ensues the impounding of these workings with water. In the winter season a vast quantity of water is lifted by the large pumping-engine, in the proportion of about twenty times the weight of coal raised in 24 hours. Two whin dykes divide the Walbottle property into three sections. The Coaly Hill whin dyke runs through the northern part of the property, in a direction north-west or south-east. The vein of whin has been cut through in the Engine seam, and was found 12 yards in thickness, with four yards or more of charred coal on each side of it. The south whin dyke runs parallel to the former, and 1580 yards to the south of it, and nearly similar in its thickness. The coal measures are not altered in horizontal position by either of these dykes. The dip of the measures on the north side of the south whin dyke is about north-east, from 1 to 2 in. per yard; on the south side of this dyke there is a slight dip in the contrary direction. The Duke Pit is now used solely as an upcast, for the ventilation of the whole of the mines, the column of 45 fms. being heated by two furnaces at the bottom of it; these are placed in the Engine seam, having communications from the lower seams by staples for the passage of the main returns. The Blucher Pit is downcast, about 800 yards east of the Duke Pit, and sunk to the Splint seam. There are here a 20-in. beam winding-engine, with cylindrical drum, boilers, and other erections, which can be used for raising men in case of need.

The CORONATION PIT was sunk to the Engine seam in 1810, and and from that to the Splint seam in 1862. This is about one mile north of the Duke pit, and adjacent to the Coaly Hill whin dyke on its southern side. This is the principal pit for ingress of air, being 13 feet in diameter, divided by plank brattice into two sections, for coal work and for pumps. The winding-engine, made by Coulthard, of Gateshead, in 1862, has two 24-in. horizontal cylinders, 5-ft. stroke, direct-acting, 13-ft. cylindrical drum, with two powerful foot-brakes, the straps acting on the the under half of two large wheels. Three plain boilers, 39 by 6 ft., supply steam at 35 lbs. pressure. The engine raises about 520 tons of coal per day with two-decked cages, two 7½-cwt. tubs in each cage, from the Splint seam level, 104 fms. The pumping-engine at the top of this pit has been standing during the last eight years; it has a 48-in. cylinder, 6-ft. stroke, non-condensing. Water was raised in two lifts from the Engine seam, 72 fms. depth. The lower lift, in the pit, 36 fms., has two 12-in. buckets; the upper lift, 36 fms., in a staple sunk at the inner side of the cylinder, within the house, has two 12-in. buckets also. This engine, and two others which have been in operation at other pits, were made at the Walbottle Colliery shops, under the superintendence of Robert Hawthorn, the colliery engineer, whose two sons, R. and W. Hawthorn, were brought up under him here, and who afterwards were widely known as engine builders at the Forth banks, Newcastle-on-Tyne.

The heapstead and other erections at this pit are all of wood; there are nine screens, two of which are double, producing large, nuts, and small coal. The workable seams of coal as sunk through in the Coronation pit are as follows:—

| | Thickness. | Depth. |
|---|---|---|
| 1.—Grove seam ..... | 2 ft. 1 in. ..... | 28 fms. |
| 2.—Grey seam ..... | 2 11 ..... | 50 |
| 3.—Engine or Townley seam—Best house coal ..... | 3 11 ..... | 73½ |
| Best fire-clay, 3 ft. | | |
| 4.—Hodge seam—Coal ..... | 1 7 } ..... | 76½ |
| Good fire-clay, worked with the coal.. | 2 4 } | |
| 5.—Three-quarter seam—Coal ..... 2 ft. 1 in. | | |
| Shale band ..... 0 4 | | |
| Coal ..... 0 6 = | 2 11 ..... | 88 |
| Inferior fire-clay. | | |
| 6.—Main coal, or Five-fourth seam—Coal .... 2 ft. 6 in. | | |
| Splint .. 0 4 | | |
| Coal .... 0 2 = | 3 0 ..... | 93 fms. |
| Good fire-clay, 2 ft. | | |
| 7.—Splint or Brockwell seam—Coal ..... 0 ft. 6 in. | | |
| Shale ..... 0 2½ | | |
| Good coal .... 3 0 | | |
| Splint ..... 0 8 = | 4 5½ ..... | 104 |
| Hard underclay. | | |

UNDERGROUND WORKINGS.—Both Main coal and Splint seams are worked; about two-thirds of the whole quantity of coal raised is from the Splint seam. A hauling-engine is placed in the Splint seam, 44 yards south 18 east from the pits, by the side of the road, the drums being over the road. This engine has two 14-in. horizontal cylinders, 12-ft. apart, 3-ft. stroke; pinion-wheel 2½ ft., driving two spur-wheels, each 6 feet in diameter; there are four drums, 4 feet in diameter, two on each spur-wheel shaft, with clutch between; the shafts can each be moved by two slide-carriages, so as to put each pair of drums in or out of gear. This engine pumps water from the sump of the pit, and forces it afterwards to the Main Coal seam, 12 fms. in height, by a horizontal double-acting pump, 6-in. plunger, 3-ft. stroke; it works on the third motion, the speed being reduced as 6 to 1. This pump is in action about 12 hours each day, whether the engine is hauling or not. Two plain boilers on the surface supply this engine with steam, at 35 lbs. pressure; it is brought to a receiver near the engine; pipes and receiver are covered. The escape steam from the engine discharges into a staple, down which a shower of water is continually falling, which effectually condenses the steam. The engine works two distinct engine-roads, with a pair of drums to each, for main and tail ropes. One road continues south 18 east from the engine, 830 yards in length; the rise is inward from ½ in. to 1 in. per yard. The other road proceeds north-east from the pit, dipping about 2 in. per yard, and afterwards turns south-east, proceeding straight in that direction to the end, dipping a little at first, and afterwards rising. This extremity is 1400 yards distant from the pit. At the extremity of each road 4-feet return-wheels are fixed. Main and tail ropes are used throughout on each plane; 24 tubs are run with each set. At 600 yards from the pit, on the north-east road, a horizontal double-acting pump is fixed, with 6-in. plunger, 3-ft. stroke, worked on second motion; the wheels are now equal, but they were formerly in ratio of 1 to 3, when a duplicate pump was placed alongside the present one, worked together from the same shaft. Motion is given to the present pump by passing the tail-rope over two 5½-ft. wheels and half around a 6-ft. wheel under them, the pinion being fixed on the shaft of the latter; 20 strokes are made per minute while the engine is hauling on this branch, and three days' pumping per week suffices to drain the workings. At the rate of 20 strokes 140 gallons will be lifted per minute. The vertical lift to the pit is 42 ft.

The Main coal is dropped down to the Splint seam by a staple 13 fms. in depth. The conveyance of coal in that seam is by horses and small ponies. A number of these are also employed in the Splint seam. In the whole of the seams coal has hitherto been got on the bord and pillar system. The oldest of the pillars were made very small, but their size has been progressively increased: at present they are formed 30 by 12 yards, bords 5 yards, walls 3 yards wide in both the seams now worked. The Main coal workings are being laid out in a district with a view to getting coal by the long wall method, with every prospect of success, as the roof and other conditions are favourable. The cleavage of the coal runs north 18 west or south 18 east. The bords are driven at right angles to this. The production of fire-damp from the seams at present worked is but small. Lamps are used only in pillar working. Where lamps are the means of lighting powder is not used. The air in circulation through the Main Coal and Splint seams amounts to 23,000 cub. ft. per minute; this air afterwards traverses the waste and returns of the Engine seam.

THE PUMPING-ENGINE.—This engine was built in 1845, at the works of Messrs. R. and W. Hawthorn, Newcastle. It is double-acting, condensing, with two large beams; cylinder 77 in. in diameter, 9 ft. 9 in. stroke, The engine-beam is 17 and 14 ft. in length at the respective ends, and 30 tons weight. The outer pumping beam is 28 ft. in length. Four double-beat valves are worked by two air cataracts from four weigh-bars and the air pump-rod. Water is raised in the first pit, where the two beams are connected, in two lifts from the Splint seam; depth 70 fms. The lower lift is 30 fms., with one 20-in. and one 17-in. bucket. The upper lift is 36 fms., with 28¾-in. ram, 7 ft. 9 in. stroke, delivering to an adit 4 fms. below the surface. In the other pump shaft, at the opposite end of the pumping beam, a lift of 66 fms. is placed, 14-in. bucket, 7 ft. 9 in. stroke, also delivering to the adit. The engine, by this arrangement, is nearly equally balanced in the up and down strokes. The 20-in. and 17-in. buckets raise 180 gallons per stroke. The ram raises 217 gallons; the difference is made up by a feeder in the shaft. The 14-in. bucket supplies 51 gallons; this, with the ram, gives a total of 268 gallons lifted per stroke by the engine. The engine is required to go in winter six strokes per minute day and night, six days per week; in dry weather five strokes per minute day and night, for four days per week. At the maximum rate of going, six strokes per minute, 1608 gallons of water will be raised=2,315,520 gallons, or 10,336 tons, in 24 hours. Four plain boilers, 32 by 6 ft, supply steam at 15 lbs. pressure, for which 18·9 tons of coal is required in 24 hours. From experiments this engine gives 202 indicated horse-power, and 161 of effective horse-power, equal 79 per cent. of useful effect. The consumption of coal is 8·7 lbs. per horse per hour on indicated duty, and 10·9 lbs. per horse per hour on effective duty. This fuel, it should be observed, is inferior small coal, or slack.

THE BRICK WORKS.—At the Clay pit, adjacent to the Brick Works, about 60 tons of coal and fire-clay are raised per day from the Hodge seam, depth 15 fms., by a 10-in. horizontal engine on second motion, with 4-ft. drum. Two clay-mills are driven by a 19-in. vertical engine, 5-ft. stroke, with vibrating lever. Two small plain boilers supply both at 35 lbs. pressure. One mill, with stones elevator, riddle, and pug-mill, is in constant operation. The other mill, with stones elevator and riddle, is chiefly used in producing ground clay, it can, however, be connected with the pug-mill by an endless band if required. About 5000 bricks are moulded by hand per day; these are burnt in 10 kilns, each of which contains from 4500 to 8000 ordinary bricks, heated by three fires in front, single chimney for each kiln.

PARTICULARS OF THE ROMAN WALL.—The foundation of a gateway for two-leaved gates, having been recently dug up near Walbottle, on the site probably of a mile castle, some account of the Roman works will be interesting. The invasion of Britain by Julius Cæsar, occurred 55 years B.C., and the Romans occupied parts of the country with a few intermissions up to the year 410, when they finally evacuated it. Their object in invading Britain seems to have been a desire for conquest and military glory, as they do not seem to have made much use of its mineral treasures; coal has been got by them in this district, as we have shown; and lead was smelted by them in Shropshire. Their principal occupation, however, seems to have been to maintain a footing in the country against the Britons on the one hand, and the Picts and Scots on the other. For the purpose of defence against the latter, the Emperor Hadrian built the the vallum or earth work, extending from Newcastle to Dykefield, in Cumberland, a length of 67 miles; this as it now appears consisted of two ramparts of earth, and a fosse between them. The stone wall fortication is attributed to Severus, and is supposed to have been built 80 years after. The wall is stated to have been 12 ft. in height, 8 ft. in breadth, with a fosse on the north side, these extending from Wallsend-on-the Tyne to Bowness on the Solway, a length of 73½ miles. The Roman troops were occupied two years in its building. The two lines generally run from 60 to 80 yards apart, though sometimes they are as far as half a mile apart, crossing hills and rivers in their course, in almost direct lines. It is probable the vallum has been modified after the building of the stone wall, so as to serve the purpose of defence on its southern side, and protect the military road which was formed between the two lines of fortification. At intervals of four Roman miles, of 1628 yards, on the stone wall there were stations or camps for the soldiery; these occupied an area of 3 to 6 acres, and lodged from 500 to 700 people in each, also defended by wall and fosse. Between these were Mile Castles, about one Roman mile apart, and 60 ft. square. Between the Mile Castles were built four watch-towers, about 325 yards apart, for one soldier. This remarkable military work is now almost obliterated in this neighbourhood, but further west on the hilly country vestiges of the wall and fosse are to be seen. The stone of the buildings has been appropriated in erecting dwelling-houses, and fences in many instances.

The march of the Roman armies was always accompanied with the formation of roads, bridges, and military works, many of their roads are still extant, as well as the remains of bridges over the Tyne.

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### MINING IN NORTHAMPTONSHIRE.

Although the Northamptonshire ore is one of the most recently discovered in England, and up to a very few years since held but in slight estimation by ironmakers, its progress of late has been of a a very marked character. At first spoken of as "Monkey Dirt," "Rhubarb," and similar appellations of anything but a complimentary character, it has now been recognised as one of the best hydrated oxides we have. Geologically speaking, the ore consisted of beds of sand, through which water, containing carbonate of iron, percolated, finding ready means of access to the rock by the fissures. For some time great difficulty was experienced in getting makers of pig-iron to test it along with other ores; but by degrees parties were induced to give it a trial on a very moderate scale, and the result at the present time is that there is now a demand for almost as much as can be raised. Large quantities are being sent to the principal works in Derbyshire and Staffordshire, whilst just now the proprietors of the Frodingham Works, in North Lincolnshire, have began to use it along with their own ore, and with the most gratifying results. Yielding from 34 to 45 per cent. of iron, the stone of Northamptonshire contains a considerable quantity of silica; it is particularly adapted for mixing with argillaceous and aluminous ores. Seeing that none of our ores are pure oxides, the great object to be attained in producing a good quality of iron is the ascertaining the quantity and character of the earthy impurities, and so adapt the fluxes as to get clear of them. For that purpose, it is necessary for the furnace master to be well acquainted with the chemistry of the articles he has to deal with, and that knowledge can only be obtained by laboratory experiments. That view has evidently been taken by Mr. W. Butlin, of Wellingborough, who has fitted up a laboratory close to the furnaces, and engaged a gentleman from the School of Mines to conduct the experiments with the ores. Since the commencement of the year the quantity of stone sent from Northamptonshire has been something enormous as compared with what it was a few years ago, and, as the deposit seems almost unlimited in extent, the increase promises to be continued. It would almost appear as if the ore permeated the whole of the county, and continued into Oxfordshire, as the same stone is now being raised in Banbury. From Market Harborough by the Midland it was cut through to Northampton, and by the London and North-Western it was cut at Blisworth, and was found in the neighbourhood of Rugby. In another direction it is found at Peterborough, and worked upwards as far as Thrapstone. There is also very little doubt but what it will ultimately be met with in the high ground around Daventry, and extending a considerable distance from there; but whether the landowners in that locality will care about working it is altogether another thing. Several of the largest proprietors, like Lord Overstone, whose extensive estate contains valuable deposits of ore, will probably prefer to have their ground intact, and leaving the development of the rich minerals it contains to their successors, who most likely will not be so fastidious. Most of the ore, it may be said, is quite close to the surface, and varies a good deal in thickness, in some places being nearly 14 feet. In some localities it is found in digging out foundations, as in the town of Northampton itself, where some very fine stones have been quarried out.

Wellingborough may be said to be the principal seat of the trade in iron and stone, so far as the Midland Railway is concerned, and from there fully one-third of all the ironstone raised in Northamptonshire is used in the furnaces and sent away. At present Messrs. Butlin and Co. have three out of their four furnaces in blast, one being out, owing to the breaking of the beam. The new works, by the side of the railway, are compact and complete, there being two furnaces, with a site marked out for some more. There are four Cornish boilers, double flued, 30 ft. long, and 6 ft. in diameter, and a pair of 60-horse power engines. In addition to the vast tract of land in Messrs. Butlin's take, we understand they are in treaty for some more, as the demand for the stone raised by them is rapidly increasing, and as Mr. W. Butlin may be said to have made the ore and iron trade of Northamptonshire what it is by his energy and study of the chemistry of the material he raised, few will be wanting in wishing him that success his efforts have so fairly earned and merited.

Not far from the furnaces alluded to are the works of the Wellingborough Bar Iron Company, commenced about two years ago, but standing uncompleted for some time past. Recently, however, an effort has been made to resume operations, and it is now expected that the spring will see the mills completed, and work commenced on an extensive scale in the rolling of bar-iron, rails, &c. A number of men are now engaged in putting in a siding to the Midland Railway, so that there is every prospect of the works being in operation before long, and so consuming a good deal of the Wellingborough iron.

The works of Mr. Williamson, close to the Midland Station at Wellingborough, are doing a very steady trade in railway chairs and similar material, made principally from the local iron. The Midland Railway Company have also added considerably to the importance of the district by the erection of a very large shed for the repairing of engines and wagons near the station, fitted up with screw-cutting, wheel-turning, and other lathes, travelling cranes, &c. The shed will accommodate twenty-four engines, and it is said a second one is about to be erected, the ground for which is being cleared.

The Glendon Iron Company (Messrs. Checkland and Fisher) have now three furnaces going, and are sending a considerable tonnage of stone into Derbyshire. The firm are also engaged in sinking a colliery near to Alfreton for the use of the furnaces. The question as to whether it is cheaper to take the coal and coke to the ironstone or *vice versa* is one that is worth considering; but the feeling, so far as Northamptonshire is concerned, is evidently in favour of the former mode. Whether, however, it is founded on economical principles is by no means so certain. Between Kettering and Thrapstone there is considerable activity in the raising of stone on the estate of the late General Arbuthnot—the works, we understand, being under the management of Mr.

Percy Arbuthnot. Most, if not all, that is raised is forwarded to Derbyshire, where the stone is well liked. The ore raised at Woodford has been at the rate of about 600 tons per month. At Islip, in the same locality, a considerable tonnage of ore has also been raised. At Cogenhoe there was not quite so much doing we were given to understand.

Leaving the Midland line, and passing through Northampton, there are several places where the ironstone is being worked, including Brixworth, belonging to the Rev. C. F. Watkins, and Duston, in which Mr. George Pell, formerly of Lower Heyford, was interested, and where a very large tonnage of ore has been raised. At Bilsworth there appears to be no falling off in the quantity of stone raised, and there has so far been a very fair market for it in Staffordshire and South Wales.

There has been a decided change for the better at the works at Lower Heyford, near Weedon, since they were taken by Mr. Plevins. After trials and vicissitudes, first under a private firm, then as belonging to a company, and ending in expensive litigation, the furnaces, of which there are three, have been kept well going, and turning out a very large quantity of iron. Mr. Plevins, we believe, is interested in a colliery in Derbyshire, from which the furnaces are supplied—or to some extent at least—an advantage of some little importance. The adjoining works at Stowe are still quiet. However, as there are vast deposits of ironstone in the district, the value of which has been now fully recognised in nearly every iron-making district in the kingdom, there is very little doubt but what there will be no lack of capitalists willing to ensure its development. At present it is said that some new ground will shortly be broken. Taken altogether, the iron trade of Northamptonshire is in a decidedly healthy and flourishing state, and, with the abundant supply of ore in nearly all parts of it, it cannot fail to go on increasing.

The very important question as to finding coal in Northamptonshire has not been allowed to sleep. There is, indeed, a much stronger desire than ever to have the matter settled in the most thorough and practical manner, and the necessary funds, it is said, will shortly be forthcoming. It has been suggested that borings should be made from the bottom of the old shaft sunk many years ago through the oolites and lias to the sandstone. That, no doubt, would be the best method that could be adopted. Whilst at Kettering a day or two since we were informed by a colliery proprietor from Lancashire that a gentleman of large landed property in the neighbourhood intended sinking on his estate for coal, and he believed he would be successful. With coal and ironstone Northamptonshire would become one of the greatest centres of the iron trade of the kingdom.

## OUR MANUFACTURING INDUSTRY—IRONWORKS.

SIR,—Your series of accounts of Ironworks are very interesting; but to be permanently valuable it is necessary they should be correct. In your account of the Parkgate Works (in the Supplement to the Journal of Feb. 18) the introductory part, which has reference to the Walkers, is not so in several respects; and no doubt but that you will be glad to make it so. Samuel Walker, in conjunction with his brother Aaron, commenced their works at Grennowside in 1741, as the remarkable copy of a document in my possession (enclosed) will show, and it was only after they had removed to the Holmes, near Rotherham, in 1745, that, in consequence of a difficulty with a partner named Crawshaw, they had occasion to ask the assistance of the Marquis of Rockingham. The works were never under the management of Tom Paine; he had a scheme of constructing an iron bridge, and for some time resided with the Walkers, whilst the models were being prepared for carrying his plans into operation; this, in some way, fell through. I believe the primitive models or drawings, or both, are now at the Kensington Museum.

In connection with the material progress of manufacturing industries, some sufficient notice deserves to be taken of moral progress, wherever manifested, especially when, as at Parkgate, of a noteworthy character. At the establishment of the works (1823), and for some years after, the workmen (gathered together from all quarters) were generally of the rudest and most reckless description. A master mason, called Woodcock, and some few others from Rotherham, by slow degrees introduced temperance principles into the works, and a considerable change amongst the better part of the workmen took place. In process of time a temperance hall was built; it was used for religious worship on Sundays, and during the week for temperance meetings, building society meetings, &c., and a very marked influence was soon excited over a considerable part of the community. Within comparatively few years two large and costly chapels and a smaller one have been erected, also a very nice church, schools, and parsonage, altogether at an outlay of not less than 10,000*l.*, and, to a great extent, religious influence, polished manners, and happy households have succeeded to their lately extreme opposites at Parkgate. A sagacious board of health looks well after the sanitary affairs of the district, and Lord Milton and other M.P.'s, or would-be M.P.'s, after the largely-multiplied electors' votes there.

*Moorgate Grange, Rotherham, March* 6. JOHN GUEST.

## INSPECTION OF MINES IN SOUTH STAFFORDSHIRE.

SIR,—It is a notable fact that in the mining districts of Belgium the Government Inspectors work amicably with the mine proprietors, and the result is that, although the pits are deep, the coal difficult to work, because of the contorted state of the measures, and the mines pregnant with gas, there are, comparatively speaking, few accidents. In South Staffordshire, however, a friendly feeling does not appear to exist between Mr. Baker, the Government Inspector, and a large majority of the mine proprietors and agents. How is this brought about? There must be some cause for it. It is evident that Mr. Baker, if he does his duty, cannot in all cases please, and yet it is not necessary that he should be at variance with a large portion of those with whom he is brought into contact. It is often remarked by the mine agents in this district that Mr. Baker always visits them after an accident, and is ready to prosecute, should there seem to be any neglect on their part; but he seldom comes at other times to confer with them, and make suggestions for the prevention of these accidents; and this would seem to be true, if we are to judge from two cases recently heard before the magistrates at Dudley. In the first case, a mine agent, named William Turner, was charged with neglecting the general rule in reference to ventilation at the Park Head Colliery, Dudley, on July 7. It seems that on the date named a boy employed in the pit died from the effects of choke-damp. Mr. Watts, solicitor for the defendant, at the commencement of the case, made objection, on the grounds that proceedings were not taken within the pace of three months, as provided they should be by the Colliery Inspection Act, the object the Legislature had in view in thus restricting the time, being that the facts should be fresh in the memory of the parties. Mr. Walker, who appeared for the informant, stated that the information was laid within three months, although the summonses were not till recently served, and therefore the provisions of the Act had been complied with; but Mr. Barrodale, the magistrate's clerk, thought the object of the Act was frustrated if the proceedings commenced by laying the information, which the defendant knew nothing at all about, and a summons did not issue for five or six months. The matter here dropped, and the case was proceeded with. It was proved that the road in which the boy was found was a disused portion of the pit, provided with air-troughs to work should the road be required, that the boy had no busines there, and that the doggy had examined the place and found no damp. The magistrates considered the case not proved, and dismissed it. Mr. Baker, through his solicitor, intimated his intention of carrying the matter to a higher court.

In the second case, Mr. Matthew Fletcher, mine agent for the Earl of Dudley's Saltwell Colliery, was charged with neglecting to fence an unused portion of the pit, in which a miner was found dead from the effects of choke-damp on August 20. The evidence of the witnesses clearly proved that the place, far from being unused, had only been commenced a fortnight before, had been worked in a day previous to the accident, and was properly examined with the rest of the pit on the morning of the day named. Mr. Walker said he was surprised to hear this evidence, and withdrew the case, but said there was another summons for non-ventilation, and it would be for Mr. Baker to say if it should be proceeded with at the proper time. Mr. Baker said he should proceed with it. Mr. Stokes, Fletcher's solicitor, said that the evidence of the witnesses was exactly the same as that given before the coroner, and Mr. Baker was present and heard it. He was, therefore, astonished that such a summons was taken out. He should take care, too, that the attention of Government was called to the way these cases were conducted. Informations, he said, were put into the Inspector's pocket, and drawn out some few months after when the circumstances were nearly forgotten.

All right-minded persons, mine agents included, would commend Mr. Baker for making an example of all who by sheer neglect endanger the lives of those employed under them; but there is no proof of any such neglect in the cases mentioned. Respectable men do not like to be arraigned at a Police Court, when there is no justifiable accusation against them, and if Government Inspectors, instead of waging a continual war against mine agents, would meet them as friends, and assist them with advice in the carrying out of measures for the prevention of accidents, they would be less frequent.

Since writing the above the second case, that of non-ventilation, against Mr. Fletcher has been heard, and a fine of 5*l.* and costs was inflicted upon him, the magistrates considering that he had neglected the rule, and that the headway where the miner was found was not sufficiently ventilated; but how they came to this conclusion, after hearing the evidence, I am at a loss to understand. The principal witness, the "doggy" of the pit, stated that the headway was only driven eight or nine yards from the airway, and an elbow air-pipe had been placed at the junction to ventilate the heading. The heading had been worked in the day before, and he had examined it on the day of the accident and found it clear from gas; the reason it was not in use was that he had an insufficient number of pikemen. The boy who was killed came down the pit in the morning, but was told there was no work for him, and repeatedly ordered to go up out of the pit. It was supposed by the "doggy" that he had gone, but it seems he crawled as far as he could into the headway, and probably fell asleep, for he was afterwards found wedged in by a mass of coal which had fallen from the roof after he had gone in, and had partially blocked it up. This fall of coal prevented the air going to, and returning from, the part where the boy lay, for the heading had been properly ventilated up to the time of the accident, and it was then clear of damp up to the fallen coal. The "doggy" was not certain whether the boy was killed from the fall of coal or from the damp, but he thought from the latter. He had been a miner 28 years; he had provided the usual means, and considered the place sufficiently ventilated. Other witnesses were called, who corroborated the evidence of the "doggy," and several good authorities gave it as their opinion that the heading was sufficiently and properly ventilated. Upon the strength of this evidence Mr. Fletcher was fined 5*l.* and costs, and it has, perhaps, saved him a deal of trouble and annoyance, for no doubt the case would have been carried to a higher court, although it is so weak. A case has been granted for a higher court against Mr. Turner, the defendant in the first case mentioned.

Mr. Stokes, in addressing the bench for the defence of Mr. Fletcher, asked if he had not a right to complain, on behalf of his client, of the proceedings of the gentleman who represented the Government in that district? It had not been attempted fairly to explain the reason why the information was not laid for two months after the offence was committed. It was the practice, however, of Mr. Baker not to lay information until the time stated in the Act had nearly elapsed. Another reason for blaming the conduct of Mr. Baker was that the case was not called on that day week, instead of bringing his client there a second time. It was all very well for Mr. Baker, as it cost him nothing. Mr. Baker supposed it was only necessary to show that a death had taken place to justify the bench in saying that the pit was not properly ventilated. Mr. Stokes contended that sufficient precaution had been taken, and that the Act of Parliament had been properly carried out. A VIEWER.

*Dudley, March* 9.

## INDUSTRIAL AND TECHNICAL EDUCATION.

SIR,—I was much pleased with the very interesting and thoroughly business-like letter of Dr. John Mill with reference to the National University for Technical and Industrial Training, and believe that if some good scheme for technical education could be devised such an establishment would be highly profitable to all concerned. For my own part I am, of course, most interested in promoting the welfare of miners. The first question, then, I consider to be—How much will it cost to pay professors in each school, or I may say in each set of schools? for we must have working professors who could deal with an entire district. Let us make no mistake. The professors must go to the scholars, for the scholars are too poor to go to the professors. By this I mean that there must be classes within walking distance of each mine, for the miners must be able to attend the classes one part of the day and work in the mines the other part. This would give us for the two western counties 31 classes—that is to say, at St. Just, Penzance, Marazion, Breage, St. Ives, Uny Lelant, Hayle, Gwinear, Crowan, Wendron, Camborne, Tuckingmill, Pool, Redruth, St. Day, Scorrier, St. Agnes, Chacewater, Truro, St. Austell, Bodmin, Liskeard, Callington, and Camelford in Cornwall; and at Tavistock, Okehampton, Christow, Newton Abbot, Ashburton, Plympton, and North Molton, in Devonshire. These 31 classes might, perhaps, be arranged in six districts, and thus six sets of professors made to suffice. Each set of professors would have to consist of five individuals to teach mining, metallurgy, chemistry, geology, and mineralogy, and applied mechanics respectively, so that the six sets would comprise 30 professors, and each professor should be required to teach two classes a day, and to visit one of the classes allotted to him each day. As this would necessitate a large amount of travelling, I do not think that the professors could be offered less than 100*l.* a year each, which would absorb 3000*l.* a year for salaries, and if to that we add another 2000*l.* a year (and we could not say less) for apparatus and teaching appliances we should provide for the whole of the Cornish and Devonshire miners for 5000*l.* a year. I estimate the fees paid by the students would meet the lecture-room expenses, as in some cases accommodation could, no doubt, be got free of rent.

For 5000*l.* a year, then, the National University could provide technical education for the miners throughout Cornwall and Devonshire; and although both at the Royal School of Mines and at the local mining schools in Cornwall it has been difficult to get a half dozen students at each class, I believe that with the superior organisation of the National University fully three times that number might be induced to attend. Taking 20 for each class we should have each professor teaching 6 times 20, or 120 students, and multiplying this by the 30 professors, we get 3600 students annually instructed for 5000*l.*, or less than 1*l.* 8*s.* a head. I know it will be said that I estimate all different students to attend each of the five classes at one place, but I think this unimportant, because I have left such a large margin that if we assume one student to attend three classes at the same time it would still leave the cost per student much under 5*l.* per head per annum, or under 2*s.* per week each. To enable them to pay this, Dr. Mill's proposed 20*l.* scholarships would be most acceptable. What I most object to in the concern is calling it a university, because I am sure the name will keep many working men from it altogether. Many, like myself, dislike universities, and prefer the good old homely name of school. Industrial School I know would be objectionable, because it would remind us of the half-criminal establishments we read of in the newspapers, but Technical School would be excellent, and I am sure the "British Technical School" would be more agreeable to workmen than "National University." An entirely new institution should have an entirely new name as regards any connection with such worn-out associations as universities, but should have the good old name of school to connect it with instruction. I really do hope the projectors of the new institution will well consider the alteration of title before issuing their final prospectus, and thus leave nothing to mar the success of so excellent an association.—*St. Teath, Feb.* 28. MINE AGENT.

## COMPUTING THE VALUE OF GOLD QUARTZ.

SIR,—Your correspondent, "C.," wishes some rule to approximate the value of gold quartz lodes, the dimensions and average yield of the ledge being given. The question is answered easily enough, provided you have a correct approximation of the value of the ore. As gold quartz is seldom found to pay nearly as regularly as silver or copper ores, it is very uncertain to calculate very far ahead. This week we may have a bonanza, or rich deposit of metal in the vein; next week it may be a borasca, or temporary failure of paying ore. Sometimes, as stockholders have learned, *borascas* continue for an indefinite period. The number of cubic feet to a ton is determined by the specific gravity of the ore. This, of course, varies, but for the purposes of rough calculation we may assume 15 cubic feet for gold ore per ton of 2000 lbs. To exemply:—Let us suppose we have a ledge, whose mean width is 5 feet, the length of our location being 1200 ft., with an incline running in ore to the depth of 100 ft.; then 5×1200×100 would make 600,000 cubic feet, which, at 15 ft. per ton of 2000 lbs., would give 40,000 tons for the first 100 feet. And then comes the really difficult question—What will it average? That known, the value of a ledge is demonstrated.

OLD QUARTZ MINER.

## NOVA SCOTIA GOLD FIELDS.

SIR,—In the absence of complete returns for the year 1870, the subjoined approximate estimate may prove useful to readers of the Journal who follow with interest the progress of this gold region:—

| Name of mine. | 1870. Estimated product. | 1862-69. Declared product. | 1860-61. Estimated product. | 1862-69. Stolen, not declared* (estimated). | 1860-70. Total estim. and dec. |
|---|---|---|---|---|---|
| Sherbrooke ....Ozs. | 7,500 .... | 40,081¾ .... | 1,100 .... | 4,758¼ .... | 53,440 |
| Waverley ..... | 1,000 .... | 41,236 .... | 1,050 .... | 4,223 .... | 47,509 |
| Renfrew ..... | 900 .... | 24,074½ .... | 200 .... | 2,492½ .... | 27,667 |
| Wine Harbour ..... | 900 .... | 15,465¾ .... | 750 .... | 1,636¼ .... | 18,752 |
| Oldham ..... | 1,500 .... | 8,321¾ .... | 100 .... | 982¼ .... | 10,904 |
| Stormont ..... | 550 .... | 8,613 .... | 300 .... | 916 .... | 10,379 |
| Tangier ..... | 1,500 .... | 5,712¾ .... | 550 .... | 721¼ .... | 8,484 |
| Montague ..... | 3,000 .... | 4,646¾ .... | — .... | 764¾ .... | 8,411 |
| Uniacke ..... | 700 .... | 6,810 .... | — .... | 751 .... | 8,261 |
| Ovens ..... | — .... | 442½ .... | 1,850 .... | 44½ .... | 2,337 |
| Caribou ..... | 600 .... | 1,001 .... | — .... | 160 .... | 1,761 |
| Unclassified ..... | 540 .... | 835¼ .... | — .... | 122¾ .... | 1,498 |
| Lawrencetown .... | 10 .... | 442 .... | 100 .... | 45 .... | 597 |
| Total .....Ozs. | 18,700 .... | 157,682½ .... | 6,000 .... | 17,617½ .... | 200,699 |

* Here only reckoned at 10 per cent. of the declared quantities, and does not include the loss arising from imperfect reduction processes, which is placed by competent authorities at 30 per cent.

If to the above we add the results which have been reported for January last:—

| District. | Mine. | Tons. | Ozs. |
|---|---|---|---|
| CARIBOU ..... | D. Tonquoy ..... | 47 ..... | 54 |
| SHERBROOKE .. | Dominion ..... | 277 ..... | 94 |
| " .. | Wellington ..... | 174 ..... | 100 |
| " .. | Palmerston ..... | 352 ..... | 72 |
| " .. | Wentworth ..... | 478 ..... | 226 |
| " .. | New York and Sherbrooke .. | 192 ..... | 55 |
| " .. | Hayden and Derby ..... | 20 ..... | 13 |
| " .. | Sundries ..... | 158 ..... | 159 |
| WINE HARBOUR. | El Dorado ..... | 147 ..... | 157 |

The vitality of the mines will not appear to have lessened in 1871; and the following extracts from letters received by last steamer give further evidence of their continued productiveness:—

"The EUREKA, at Wine Harbour, at last crushing of over 100 tons, gave over 1 oz. to the ton. The EL DORADO the same, and that, too, from a 12-ft. lode. The ST. ANDREW'S, at Oldham, is also crushing some good rock, and our capitalists are finding that if it (gold mining) is gone into as a business it will pay. They are working the CENTRAL and BRUNSWICK, at Uniacke, on tribute. The UNIACKE employs ten men. We have had very cold weather, and very little snow—18° by night and 8° below zero by day. Hall has made arrangements for a crusher at BEAVER DAM. WAVERLEY is also looking up. Mr. Clarke has just put a pump into his mine, driven by his crusher-engine by a wire-rope."

Of the Sherbrooke district a correspondent writes:—

"There is no alteration in the WELLINGTON lode to notice. In the DOMINION, though the lodes or belts are large, they are not opened in a miner-like way—consequently, profits are small. The WENTWORTH is producing 100 ozs. of gold per month, and giving good profits. They are also driving a cross-cut north in order to intersect several parallel lodes which are thought to be productive. This property is looking well. The NEW YORK AND SHERBROOKE is yielding about 130 ozs. per month, which gives a fair profit. The PALMERSTON is on poor ore at this time, though about paying cost. They expect shortly to strike another run of gold, which will put them all right. On the EXCELSIOR (Timothy Wright's) they have to sink yet 20 ft. in the rock before they meet with the run of gold. The weather has been very unfavourable for surface work—consequently the men could not make good progress in sinking. The men on the Sears lode are expected to strike the run in nine or ten days more. There are now ten tributers at work on this property, whose improvements will not cost the owner one cent. CLEVERDON AND CO., adjoining the Excelsior, are raising very good quartz, and working at a profit. The WOODBINE, for a long time abandoned, has been started afresh, and looks well now. On the whole, the mines look as well as one could expect—for here when they find one run of gold they work it as long as it pays, and *never try the other lodes*, which are likely to be equally productive. Cornish mining would never pay as things are worked here."

The closing remarks of this correspondent—an experienced gold, copper, and tin miner—precisely explain the cause of previous and present failures, which, with other promised details, shall form the subject of a future letter.—*London, March* 9. ACADIENSIS.

## AMERICAN MINES, AND FOREIGN CAPITAL.

SIR,—A gentleman asked me yesterday, why is it that you Americans come to us seeking capital? It has been stated by some of your own newspapers, and the statement has been repeated by the *Times*, that good mining property need never seek capital outside of the United States. This is an erroneous idea, nurtured by the San Francisco papers in the interest of a few capitalists.

Why is it that the South Aurora came to London for a market? Governor Stanford, the principal owner, had been a prominent business man in San Francisco, and was well acquainted with everyone there. Why had the Eberhardt to come here? Mr. Applegarth will surely not say that he could find purchasers at a fair price in San Francisco. I challenge the San Francisco press to name any business firm or set of men there or elsewhere in the States who are known to the community as mine purchasers. That city is infested by a number of broken-down Washoeites and the agents of a few capitalists there who want to serve as middle men between the miners and purchasers; but as to buying the mines, they have not got the money, nor the one-hundredth part of the money, necessary to develope the mines of the Pacific Coast. This statement, which has been so often reiterated within the last five years, is a most insiduous attack on our mining interest. The parties who have originated it know it to be false, but from my respect for the *Times* I am inclined to believe that it is an honest error of that great journal. A single illustration, I think, will be sufficient to convince. The Comstock lode, through its various companies, all of which are American, has yielded $120,000,000, but they are now down to such a depth on it that with water and other difficulties it is ceasing to be productive. The Sutro Tunnel Company, with a franchise from the State of Nevada, and a special Act of Congress in its favour, both conferring exclusive privileges, with the bounden agreement of the various companies operating on the Comstock, to pay $2 per ton royalty for the privilege of carrying their ore through the tunnel. The enterprise is considered a sure one, endorsed on all sides, and operating in conjunction with properties which have paid the largest dividends known. Sutro has been at work on it, seeking capital and otherwise, for about six years, and the tunnel is in only 2200 ft. And he has now gone begging to Congress for the Government to take the work in hand and put it through. This is the tale in a nutshell; but the Franciscans fear to speak the truth, lest they should lose the hold they had on the mines prior to the building the Pacific Railway. Seeing that the road has opened out new avenues, they damn the Chinamen who built it, and say if they had it to do over again they would have no railroad. New York does not understand mining at all, and so we come to you who have been in it a long time, and should understand it. A NEVADA MINER.

## EBERHARDT AND AURORA MINING COMPANY.

SIR,—Within the last few weeks strong "bear" transactions have knocked these shares down to 15*l.*, 15½*l.* Shareholders need not take an alarm, but, on the contrary, must hold their valuable property so much the firmer. No cause can be shown for the fall of about 15*s.* The news has yet to come, and the returns from the Great International mill of 60 stamps will very quickly dispel all doubts. There are at the present moment enormous masses of silver ore ready for the mill, and ore is dug out much richer than the vendors of the properties ever believed to exist.

Again, 100 tons a day can be crushed at the great mill stamps—120 tons if pushed—say, 100 tons at 25*l.* per ton (hundreds of tons taken from Ward Beecher, and I believe Eberhardt can produce ore worth 50*l.* and even 60*l.* per ton). We then have 600 tons per week, at 25*l.* per ton = 15,000*l.* per week, or 60,000*l.* per month—say less, 40,000*l.* per month. Here we have 480,000*l.* a year—a nice little interest on 200,000*l.* Our small mill has proved equal to 48,000*l.* a year (over 4000*l.* profit a month by the last telegram). The total is then augmented to 528,000*l.* a year, or, as I observed in a previous correspondence, 600,000*l.* a year is not considered too high an estimate for the returns. The directors know well enough this property needs no laudative reports or puffing; a glance at the plan of these mines would satisfy an incredulous Hebrew. Information is always kindly offered, and the company is worked unostentatiously and thoroughly, at the same time vigorously. When these shares stand at 50*l.* a share the incredulous public will also open their eyes,

and buy. It has been observed by a very astute stockbroker that the public never really buy until a stock or share stands high; a cheap investment they pass over. I have no doubt but that these shares will stand much nearer 100*l.*, and return over 20 per cent. on that quotation. Lastly we come to South Aurora, with its one mine, standing at 300,000*l.*, now at a premium of (say) 10s., which makes it 350,000*l.*, sending home scores of bars of silver. Now, if this concern is worth, with its solitary mine, 350,000*l.*, what must Eberhardt and Aurora, with five rich mines, all proved and tapped in numerous parts, and communicating by enormously long adits, be really worth?

At 15*l.* a share the market value is 300,000*l.*—*i. e.*, 50,000*l.* less than the quotation of South Aurora, ex. div. It strikes me very forcibly if the directors of the South Aurora were to suggest a negociation of exchange of properties, on condition of receiving 50,000*l.*, the present market price difference, that the Eberhardt Company would demand one million sterling the other way! South Aurora joins Eberhardt, and is a valuable property, paying magnificent dividends, but in comparison with Eberhardt and its five rich mines, is as a pigmy to a giant. The wealth of Eberhardt is practically unlimited; the deeper the miners sink the richer the treasures exposed. The Nevada newspapers turn to the subject of these amalgamated mines with praise and surprise, and a local opinion of a mine is worth twenty reports. Every ignorant miner on the spot talks of what he sees and handles with his spade. No property will equal Eberhardt for certain success and enormous gains. So beware of the "bulls," as the rise in value is at hand. H. P. B.

*Hammersmith, March 6.*

## MINING PROTECTIVE ASSOCIATION.

SIR,—I have been reading the communications in the Supplement to last week's Journal respecting the Protective Association about to be formed in California for the purpose of selling mines—the objective point, as I understand it, being European capital. The Californians want the mines to bring as high a price as possible—we want to get them as cheaply as possible. But with the executive officers of the Association to divide with, the original owner of the mine would get very little, or the mine would have to bring an increased price. I am not sure that there is not some "wire-pulling" behind the scenery of the meeting in the Senate Chamber at Sacramento, and hope the consuls are not to be made cat's-paws of.

In lieu of having the association on the Pacific, it seems to me that here is the place to form the association, which might send out from time to time examining engineers, in whom they had confidence, to report on property offered through the Association. Honestly conducted, it would save a great deal of expense, especially in preliminaries, as at present in nearly every case we have to send out an engineer or two for the special purpose of examining a single mine.

OLD BROAD.

## FLOATING PROSPECTUSES—PYRAMID RANGE.

SIR,—I only arrived here by the last Cunarder, and on enquiring what prospect there was for putting on a really good mining property from Nevada, was informed that the last scheme, yclept the Pyramid Range Company, made a disastrous failure in its effort to float. The exact reason of this failure I am left to surmise; but on perusing a prospectus, I noticed several statements therein, which, in my humble opinion, would be sufficient reason to prevent anyone from investing who examines carefully, or as carefully as he can, into the statements made by the projectors of a company. That immense bodies of silver quartz above ground exist in New Mexico is now no longer a matter of doubt in the United States, since Governor McCormick, the member from Arizona, returned to Washington by that route, and attested the existence of these mammoth ledges in a speech in Congress. But that almost anyone personally unacquainted with the property, or the persons representing the party, would feel very much inclined to doubt the truth of the prospectus after reading the preamble of traditionary yarns, collected from Jesuit manuscripts, seems to be altogether natural. A person, therefore, of an investigating turn of mind, would consequently turn from the "big injun" story to the directors of the company. Now, as to the English directors, bankers, brokers, &c., I have not one word to say, for I have not the honour of an acquaintance with any of them; nor will I trouble you with anything about Messrs. Harpending and Roberts, for a friend at my elbow informs me that they were analysed in the Money Article in the *Times*. The only Americans left are John D. Fry, "President of the Comstock Mines, Nevada," and Solomon Heydenfelt, *ex*-Chief Justice of California. I submit it, whether the above title after Mr. Fry's name was not intended to convey the idea that he was the President of the companies operating on the Comstock lode; whereas, instead of being the President of even a single company on this great lode, he is only a director of one of the minor companies; indeed, this Mr. Fry never came to the surface until some time after the great companies on the Comstock had ceased to pay dividends. Mr. Solomon Heydenfelt, who is paraded as being an *ex*-Chief Justice, is Mr. Fry's brother-in-law. One more point and I am done. A speech made by a Mr. Williams, at Ralston, is headed as the "Remarks of Mr. Senator Williams," evidently intending to convey the idea to the British mind that it was Senator Williams, lately spoken of as Minister to England, and now of the Joint Commission. Were these misstatements wilfully made? There are plenty of rich mines on the Pacific Coast, and I think that a straightforward course will cause British capitalists to invest in them.—*The Langham, March 7.* ENFANT TERRIBLE.

## MINING IN SWEDEN.

SIR,—Mining operations have been very much retarded this winter by the extreme cold that has prevailed, but we are all pleased that the two coldest months are passed—January and February.

I observe by the Journal that the mines in Wales have suffered from the cold weather by having all their machinery ata standstill. The same complaint can be heard in this country. At the same time, considering the state of the weather, a number of mines, ironworks, and mills have been, I may say, in continual operation, but it muet be remembered that the water-courses, wheels, &c., are well protected from the frost—in fact, good and substantial wood buildings are erected over the machinery. This plan is carried out on the Continent and in this country with good effect, and from my experience of mines in England and Wales I am certain it would be a great saving, and enable the mines to be kept continuully at work, in Wales particularly, if the same plan were carried out. Of course, the price of timber will be a great consideration; here it is cheap, still I am certain it would pay for itself in the course of years. Some of your readers may be interested to know that the cold has been so sharp this winter that the mails were carried on sledges by horses, from this country to Russia, over the Baltic Sea, which at present is a vast field of ice, grand to behold, but not pleasant to go travelling on.

Such cold weather only occurs once in 15 or 20 years, as generally the steamers and ice-boats have been able to maintain the communication between this country, Russia, and Denmark. The latter boats have runners fixed to the bottom of the boat, and using sails, the speed attained with a good breeze of wind is rapid indeed. This plan can be carried out when the ice is even tolerably clear of snow, otherwise the men have to draw the boat by manual labour, which is attended with great risk, and although there are not many lives lost, the men often get a cold bath during the winter, and in the spring, when the ice begins to break up.

The different railways have had a troublesome time of it, and hundreds of labourers are occasionally employed in cutting through the snow drifts, yet pretty good time has been kept by the railway companies. Some of the lines pay remarkably well; the Gefle and Falu paid during the year 1870 on the capital invested 18 per cent.; length of line 52 miles. It may be called a mineral line, as great quantities of mineral are carried by it, also timber, to Gefle, for shipment to the South of Europe. The main line is under the control of the State, and is open from Stockholm to Gothenburgh and Malmö, and in spite of red-tape and the Circumlocution Office, pays a fair interest. It would be a valuable property in the hands of a private company. The Swedes have, I believe, their eyes open now to the value of railways as a means of rapid and cheap communication, as several new lines are projected, and I believe several million dollars have been subscribed already. There are magnificent deposits of magnetic iron ore here unworked for the want of a quick and cheap means of transporting the raw material, and also manufactured iron to the sea board. I am convinced there is no better speculation than to buy up iron mines and timber in this country, both articles will be of great value hereafter. Of course the idea is to establish large works here and compete with the English ironmasters in supplying Russia with railway material, and also their own new lines, instead of importing it all from England. Iron and limestone can be had cheap here, but the great want is the black diamond. In anticipation of peace and improved trade, iron of all descriptions has advanced 25 per cent. this winter.

While on the subject of mines and mining I may note some accidents that have taken place here from the use of dynamite. A miner at an iron mine in this district had charged a hole with dynamite, and fired it in the usual way, but it did not explode. After waiting for some time he returned, and commenced to bore out the hole again; while engaged in doing it the charge exploded, which cost the poor man his life. I may say that the miners waited for a considerable time before returning, and boring out the hole was against the rules of the mine. As very few accidents, so far, have occurred from the use of dynamite, the idea is that the fire must have remained in the fuse, as it is not generally supposed that the force of boring out the hole would cause the explosion. A second case occurred here a few days ago: 12 or 14 days previous to the accident a hole was charged with dynamite. The manager told me that the charge exploded in the usual way, and blew out the tamping of burned clay. Last week a miner was told by the foreman to prepare the hole for charging again, which was full of water, and while in the act of driving in the claying bar an explosion took place, and the bar was carried to a great distance by the force of the explosion, the mine being open to the surface. Great fears are entertained that the man will be deprived of his sight. At present it is quite a mystery how it occurred, and the only conclusion arrived at is that a portion of the dynamite must have remained unexploded, or in the cracks of the rock, and that the force of the bar being driven in caused it to explode.

*Sulphur Mines, Norrtelje, Sweden.* W. HOSKIN.

## THE TINTAGLE MINING DISTRICT, CORNWALL.

### KING ARTHUR SILVER-LEAD MINE.

SIR,—Under the above heading, I observe in last week's *Mining Journal* a letter signed, but not *inserted*, by me, which is a correct copy of my professional opinion on this mine, as given by me in writing to one of its directors. Had this letter appeared in the report of a meeting of the company or otherwise, if only accompanied by a few words explaining how it came to be published in your Journal, I should not have troubled you with these remarks, or the request that you will publish this letter also in your next number, as a protest against its having appeared in such a form as may lead the public to suppose that it was inserted by me as a sort of indirect advertisement of this mine—a proceeding which I hold to be altogether beneath that scientific and professional standing which I have always aspired to. DAVID FORBES, F.R.S., &c.

*York-place, Portman-square, March 6.*

## HOME INVESTMENT.

SIR,—An ancient adage of the well-worn old hacknied type is always in season. Taken kindly, it stimulates the experience of the old boys of the world's school, and to the young tyros of the said establishment gives a zest for those enormous quantities of that same bitter-sweet aliment which all are doomed to swallow. Hence it is that the trite application of language to fact, as illustrated in the *dictum* "A rolling stone gathers no moss," is so essentially specific in its effects, and universally applicable. No one doubts it—no one can reject the indicating principle it involves, yet times there are when it creates throes of memory not always philosphically bearable. Now, it frequently comes to pass that the young generation born to fortune are very apt to assume immediately that manhood dawns upon them through that encyclical atmosphere represented by the figures 21, a buoyant, jaunty independence, that suggests to each individual the constitutional right of doing what he will with his own. The exercise of such an attribute is, none can deny, very pleasant to contemplate; but, unhappily, it is not always profitable, and therefore satisfactory, in its results. It but too often leads to erratic liberties, in the enjoyment of which prudence is forgotten, and folly of rapacious but infirm grasp takes possession of the judgment seat. What follows in such a case all can understand:—precept and example are alike, in cold companionship, consigned to the tomb of the Capulets, figuratively speaking, or to any other morbid receptacle. The game of speculation goes on, ill-considered enterprises are entered upon—the myths which lured the inexperienced and incautious into treacherous mazes remain for a space as seductive and attractive as ever; but, too soon, the turning point is reached, and then the scene changes. Those golden prospects which the eye so hopefully dwelled on begin to fade out, revealing, what had been hitherto masked in delusive light, crude realities barren and unpromising. Such transformations are very interesting on the boards of a theatre, but marvellously perplexing and inconvenient on the stage of life. Hence, Sir, that although I had intended my letter in your last week's Journal should have concluded my correspondence on the subject of "Home Investment," I venture, in order to complete the series, to submit my present remarks, for if I can possibly induce through them monied people to institute a comparison between the security insured to them by mining as it is and that which is offered by numerous foreign speculations, which are now being forecast on the market, it would be eminently serviceable to our capitalists on the one hand, and on the other to the industry our mines represent. It is an incontrovertible fact that great risk and uncertainty in the managerial point of view attaches to foreign mine adventure. In the first instance, there is the great difficulty of authenticating the value of such property as to its mineralogical features, its position for the preparation and transit of products, its advantages as to the requirements of the labour employed, such as wood, water, &c.; while the only alternative left to enquiring shareholders who seek practical proofs is to send out from time to time, at an enormous expense, agents upon whose inspection and reports they can depend. Again, with regard to the realisation of invested capital through the sale of shares on the home market, there occur in adopting such a course great delays, great variations of price, and frequently through the *modus operandi* of brokers on such occasions great losses, and a too sensible deterioration of stock. While the facilities for scientific identification, the rapidity of acquiring requisite information, the immediate supervision on the part of the shareholders of management and of returns proximate, actual, and in perspective of any given undertaking, sale of shares, and so forth, are all amply afforded by mine enterprise in Cornwall, Devon, Wales, and other parts of the United Kingdom.

Surely those are desiderata well worth the consideration of English capitalists. There is no sophistry in this representation of the superiority which the mining industry of this country possesses over that of all others. And now looking to the state of the Continent of Europe contingent on the Franco-Prussian war and its disastrous results to our immediate neighbours, the most ordinary observer must perceive that the balance of power is shaken, the whole fabric of the commercial, manufactural, social, and political European organisation, founded more than half a century ago, disrupted as to its main and fundamental principles, and insecurity for capital substituted for that guarantee supposed only a few short months since to be unapproachable in its integrity, and from which such vast and general prosperity flowed in upon all nations, particularly upon this. In view of such a *status*, then, at the present it is a legitimate question whether investment in foreign enterprise has not become a hazardous speculation. No very great amount of common sense is required to answer that query; and, before quitting the subject, I would whisper caution to capitalists against allowing their resources to be diverted from the home channels of industry by the numerous foreign loans, particularly those French municipal ones already anticipated, which will be presented to this country for negociation.

Let English capitalists but support enterprise here under their own eyes, let them but come forward in a liberal spirit to support our British mines, now conducted by science and experience of the first order, and managed by men of unblemished probity and ability, upon an unexceptionable commercial system, and they will be repaid for hundreds by thousands, and will diffuse the benefits of peace, prosperity, and popular independence, the best impetus to progress, throughout the vast and inexhaustible mineral districts of England.

85, *Gracechurch-street.* J. P. ENDEAN.

## MILNERS' PATENT SAFES.

SIR,—In Lord Enfield's reply to Colonel Sykes, with reference to the destruction by fire of the consular buildings at Shanghai, reported in the parliamentary intelligence of to-day, he mentioned that the wills and other valuable documents were all preserved in a safe. Would you kindly mention that the *Shanghai Courier* of Dec. 20 stated that they were preserved in two of "Milners'" safes, and that the Chinese titles and bills of sale which where in a common iron safe were all destroyed. THOMAS MILNER AND SON.

*Lord-street, Liverpool, March 3.*

## THE VAN MINE, AND ITS PROSPECTS.

SIR,—I perused with much interest and with still greater satisfaction the details of our general meeting, as reported in last week's Journal. The remarks of our able Chairman was as lucid and explanatory as the report of our zealous manager was satisfactory and encouraging—far, very far, exceeding anything that the most sanguine among us could have anticipated. The fact that while the permanency of the mine is being daily augmented in the ratio of ten times the amount of ore at present extracted the return can be increased to 500 tons per month without increasing the cost, that the outlay must decrease proportionately with increasing appliances, that by means of the railway every facility will be afforded for transit, and that laterally as well as in depth the resources of the mine are unfolding themselves in a manner altogether unprecedented in the history of mining—is beyond doubt the best report that can be submitted; and when there is added to this the announcement made by Capt. Williams, that by the expenditure of 4000*l.* the monthly returns can be increased to 800 tons of lead, it may be deemed a difficulty to require anything further. For this reason I shall probably be classed in the category of "irreconcileables," when I point out that one important item of intelligence was omitted—that is, the computed amount of profit when the return shall have reached 800 tons per month. One of your correspondents a short time since elicited from the manager of the Roman Gravels—a mine which is admitted on all hands to be second only to Van—a most satisfactory reply to a similar question, and probably Captain Williams will now afford us like information in regard to Van. I am well aware that Capt. Williams very properly hesitates to say what he thinks—nay, what he really knows—as to the great and growing future of this store-house of wealth, and that he will not publish many facts which he has communicated verbally to friends, but in the interest of shareholders to submit that he should express some approximate opinion. We are not all so thoroughly practised and *au fait* in such matters as our worthy Chairman or some of our directors, who are doubtless able without difficulty to calculate pretty accurately what amount of dividend will be realised by a monthly return of 800 tons of lead (exclusive of blende), nor are all of us to add that necessary margin of increase to all estimates and computations made by Capt. Williams—therefore, I (and I do not stand alone) should like to know Capt. Williams's opinion upon this point.

Again, the Chairman mentioned that the lode has been opened upon in length 160 fathoms. Judging from what I read in respect of other lead mines, this of itself is a startling announcement; but perhaps not more so than that subsequently made by Capt. Williams, that for the same quantity of ore raised from the 45 as is now being raised from the 15 and 30 fathom level, double the quantity of lead will be returned. Surely these are facts hitherto unrecorded upon the pages of mining history.

One of my chief objects, however, is troubling you with this missive is to suggest to the board the desirability of multiplying the present number of shares into (say) 60,000. This could be easily accomplished under the Companies Act, the shares being fully paid. The advantages resulting from such a step are sufficiently obvious; the present large holders could retain their interest, divided into an increased number of shares, while opportunity would be afforded to large numbers who have been long anxious to have an interest in Van, but unable under present circumstances. The shares, too, would at once become more marketable, which, according to the views of some, is a desirable object to attain.

*March 8.* A SHAREHOLDER.

## BUDNICK CONSOLS.

SIR,—I agree with your correspondent in the Journal of Feb. 18 and 25 as to the genuineness of this property, but in my opinion they are wrong in recommending a 60-in. engine. A 50-in. is sufficiently large to drain the mine 70 fms. below the present depth, and can be erected at much less expense. Some years since a new 50-in. engine from the Perran Foundry Company was, by the advice of the late Capt. Samuel Grose, erected, but, unfortunately, in the wrong part of the sett; and, when too late, it was discovered that nothing could be done unless it was removed to the eastern part of the mine, where it is now proposed to fix one. I was a shareholder at the time, and can bear testimony to the fact that it is a sound, legitimate investment.

It may not be out of place to mention that in the last month's working they sold near 10¼ tons of black tin, and much greater results may be obtained when properly developed. A MINING ENGINEER.

## SOUTH CONDURROW MINE.

SIR,—The meeting of shareholders was a decided success, and far above the most sanguine expectations. The course taken by Mr. John Field is worthy of remark, as it would be inconsistent in my view, seeing that the mine is now opening out so splendidly, to charge up an additional month's costs now, as they can easily bring them up gradually without interfering very materially with the finances of the company. Tincroft accounts have been written against very much because they declared dividends whilst they were in arrear one month's cost more than some people thought they should be, but the able manager knew his course, and would not listen to the attempts to upset his accounts.

The account of the condition and prospects of the mine, by Mr. W. C. Vivian, gives me, as a large holder from the commencement, great satisfaction, and indeed it has infused more confidence than ever into the minds of Cornish people as to the truth of the manager's statement, for several of us have sent an eminent Cornish mine agent underground, who has a decidedly better opinion even than the managers. It would be much more satisfactory if people would but honestly state the facts, and not mislead the sensitive shareholders by statements as injudicious as they are false. It would appear as if the 71 west is now the most remunerative point, and should it be holed, as they daily expect it to be, even one-half as good as it is now, it will lay open a very valuable run of ground for 200 fms.

The reserves have surprised everyone, and the permanency so often dilated on by some of your correspondents is certainly now proved. In view of this, and of the prospects of the tin market, I think we can still look forward to a continued handsome return for our capital invested. SHAREHOLDER.

*Camborne, March 7.*

## SOUTH CONDURROW MINE.

SIR,—My attempts to prevent the public from being unduly led to part with their shares in this mine on reports that no dividend would be declared at the last meeting have not been without their effect, and having infused a little confidence at that time I wish now to do even a little more than I did then. I have recently had the property inspected by a competent authority on Cornish tin mining, and I do not hesitate for a moment to say that the returns of tin will be very considerably increased during the coming four months, and a dividend equal to the one just made will be declared, even though tin should recede to 70*l.* per ton, but of which there is little prospect at present, seeing the large orders which are now to be executed.

The public will now, I presume, place a little confidence in the statements I may make, and for every one of which I hold myself responsible. I want shareholders in this undertaking to hold on their shares, and wait the further development of the mine, and I feel assured that they will be handsomely rewarded for the confidence placed in my statements, as well as for the time they may wait. I do not well like to say much in favour of managers, fearing it may be regarded as superficial, but in this instance I most sincerely think that the managers should receive at the hands of the shareholders a recognition, however small, for the plodding industry and exertion displayed by them in bringing the mine into a dividend state, and with such prospects of permanency as it now furnishes. Capts. Vivian have had "bad luck" lately, and I, and I believe many others, do not fail to feel a pleasure in seeing the good results of perseverance now being revealed in the development of this property.

Let shareholders beware of the damaging influence some men exert to endeavour to depreciate the value of property to serve their purpose, and I would not be unmindful that some person may attack me with the statement that I also am specially interested in praising this mine; to this I assent, and as it is impossible for anyone to confute the statements I have made, I am free from an injury in this respect, as it is only right that this property should be fully known and appreciated by those who invest their money in Cornish mining.

*Truro, March 7.* INVESTOR.

## VIRTUOUS LADY MINE, AND ITS MANAGEMENT.

SIR,—There is one feature in connection with this mine that seems to have been completely overlooked, though in reality one of the most important—the financial management and condition up to the present time. Many were the accusations launched in the latter portion of 1869 and the early part of 1870 against the so-called unprincipled promoters, who were loudly charged with imposing on the innocent public with exaggerated statements and baseless hopes; and many were the predictions that these clever adventurers, after feathering their own nests well, would take wing, and leave the deluded victims to their fate, with the Virtuous Lady a barren corpse upon their hands, and "robbed of all her charms." In other words, it was roundly asserted that while the selling of shares was brisk and continuous, no capital was being set apart for the development of the mine, and that the company, after dragging through a brief and troubled existence, was destined to be a speedy and unnatural end.

Such were the accusations; such were the predictions. Now, what are the *facts?* I will answer. The much-maligned individuals who constitute the board of management (including the indomitable secretary) girded themselves to their work with honesty of purpose and energy of action. They were *not* men who, having once put their hand to the plough, finding the ground tougher than was expected, would retreat from the undertaking, but animated by a fixed and large belief (founded, according to their view, on indisputable data) in the sterling value of the property, believing that the Virtuous Lady only required legitimate assistance to bring forth ample treasures to reward a great expenditure of capital and energy, they at some considerable temporary sacrifice to themselves set apart the capital required for the enterprise, and from that time to this have grudged

nothing in the way of reasonable expenditure to attain the end in view. For now the better part of two years has this expenditure continued to be made on one of the largest setts in the United Kingdom: and this by a company charged by its opponents with being without capital, and its managers without probity. The company doomed to so speedy extinction is now more lusty and vigorous than ever—the men branded in anticipation as deserters are at their posts, "with mien unaltered and with purpose fixed."

Now, I would ask, can there by any possibility be a more conclusive refutation of the accusations and predictions so hastily and uncharitably made at the time, or can any more positive proof be offered to the public of the fair and *bona fide* character of this enterprise? From personal knowledge also I can vouch that no one can have the welfare and the credit of mining more at heart than the gentlemen who have the management of the Virtuous Lady; they respect those who cherish the same objects, and now that time and events have brought about their justification, they bear no ill will towards any who may have formerly opposed them, but, on the contrary, are ready to hold out to them the right hand of fellowship, being convinced that the feeling which prompted the opposition was commendable though groundless.

Again, as to the mine itself, a certain stigma was in the opinion of some attached to it from the fact of one or two brokers of London having some time before taken it in hand and failed, though it was doubtless not known that the failure was due either to lack of courage or to insufficient means (which circumstance, be it observed parenthetically, is now another justification of the present company which has demonstrated its possession of both the courage and the means). To this stigma some colour was gradually lent by the rather lengthened delay in reaching any of the points of the mine aimed at; but that it was purely imaginary ought to have been apparent to all from the "reports," which one after another in long succession appeared in the Journal from eminent mining agents—men of probity and reputation (reports which I think the secretary would do well to re-publish at the present time). These men, one and all, expressed with great force their high opinion (I should rather say *conviction*) of the great value of the sett, and of the magnificent prospects it held out to the adventurers who should develope it. Whatever predictions, therefore, as to results were made at the time were at least partially justified by the professional testimony of these men. On one point only can reasonable complaint be made against the enthusiastic secretary—his error in predicting the date by which great results would be arrived at. But that was a fault which doubtless every shareholder will be willing to condone on the condition of final success. Mr. Barnard in his enthusiasm undertook to build Rome, not exactly in a day, but in manifestly too short a time. The mountains of strata were too great to be moved even by *his* faith in so short a period. There is no "Open Sésame" in mining. The earth brings forth her minerals only in response to skill and toil; and the Virtuous Lady had to be assiduously wooed before she would consent to yield up her treasures. That she is at last, however, rewarding the constancy of her admirers; and that the predictions of her secretary are at length approaching their fulfilment needs no further evidence than the reports in last week's Journal from Capts. Horswill and Rowe—the one the agent for the copper, the other for the tin part of the mine. One hundred tons of rich ore, the produce of only a few weeks since the shaft has been communicated to the south lode, is such a commencement as few mines can show, while with lodes of the value described already laid open, and with the tin sett in active operation, it cannot be long before the Virtuous Lady will take an honorable position in the Dividend List, and afford a complete and lasting justification of herself and her supporters. VERAX.

## THE EXTENSION OF THE SOUTH STAFFORDSHIRE COAL FIELD.

The monthly meeting of the South Midland Institute of Mining, Civil, and Mechanical Engineers was held on Monday, at the Exchange, Wolverhampton, the President (Mr. J. P. BAKER, Her Majesty's Inspector of Mines) in the chair. There was a numerous attendance of members, and several gentlemen not members were also present, it having been made known that a paper "On the Extension of the South Staffordshire Coal Field" would be read, and that a scheme would be brought forward for forming a joint-stock company to make sinkings on Lord Hatherton's estate, and to work coal and ironstone, if such should be found to exist within workable depths. Among those in the room were—Messrs. J. G. Barker, M. Ironmonger, H. Underhill, H. H. Fowler, S. York, F. C. Perry, E. A. Foden (agent to Lord Hatherton), E. Jones, D. Jones, T. Ironmonger, H. Beckett, S. Bowkley, J. Rosse, T. Holcroft, J. C. Homer, S. Watkins, F. Bowkley, W. Fenn, W. Ness, J. Smith, J. Onions, J. Williams, H. H. Beckett, J. Tolley, A. Bowkley, J. Gethin, B. Skidmore, W. Groke, jun., J. Bromley, H. F. Griffiths, J. Nayler, H. Smith, J. Laxton, C. Simmonds, W. Underwood, G. T. Smith, H. Willcock, jun., R. Davis, J. Spittle, W. Parton, T. Bridges, S. Bailey, W. Blakemore, J. Greeve, J. Gardner, E. Phillips, H. Fisher, and James Cope, hon. sec. Messrs. J. T. Tatlow (Wolverhampton) and E. Fenn (Blankenhall) were elected members.

Mr. BOWKLEY then read a paper, the subject of which was "The Extension of our Coal Fields." He said his explorations were not yet finished, but he was prepared with some general remarks, intending to continue the subject in another paper which he was preparing. His object was to point out the extension of the coal beds under a great portion of Cannock Chase, eastward of the Huntington Belt and Bednall Hills, and to prove the continuance of the coal measures beneath the New Red Sandstone, westward of the Huntington Belt, and the existence of them in Huntington, Brewood, Stretton, Penkridge, Wheaton Aston, Church Eaton, and Shifnal, joining the Shropshire coal beds. He contended that there was an identity between the beds of coal and ironstone in South Staffordshire and the Shropshire coal fields; that the coal fields of the Midland Counties were produced under similar conditions, and that they were elevated to the surface by igneous action, being broken off from coal beds now lying undisturbed under the New Red Sandstone formation of the Midland Counties of England. As to the continuance of the coal measures under Cannock Chase eastward, he thought there would be no doubt in the mind of a careful observer that the coal measures before their upheaval were covered over by the Permians and the New Sed Sandstone, and that the pebbles and conglomerate forming the hills in this part of the Chase were the result of the same disturbing forces which brought the coal measures up to the surface, whereby all the New Red Sandstone which rested upon the coal measures was stripped off and denuded, and now formed a covering to the coal beds in different parts of the coal field; and the fact of the materials composing these hills having been disturbed but not entirely denuded gave good indications that the coal beds had not been denuded to any great extent. He could discover no great indications of any great number of faults or dislocations. The proximity of the pits belonging to the Hednesford and Cannock and Rugeley collieries to the Jockey Hills, and the successful sinkings at the West Cannock Colliery, so near to Brindley Heath, afforded sufficient proofs to warrant the opening out of mining operations both under Brindley Heath and the Jockey Hills, whence a market might be easily opened to all parts of the kingdom.

Mr. Bowkley then adduced evidence to show that the coals and ironstones under Cannock Chase were identical with those under the central part of the coal field, and also with those of the Shropshire coal field, contending that it proved that the two coal fields were deposited at the same time, and under similar circumstances, and were thrown up above the surface by the same agency at the same time, although the Shropshire coal field had not been so much denuded as the northern portion of the South Staffordshire coal field. The next part of the paper was intended to prove the continuance of the coal beds under the Permians, and subdivisions of the New Red Sandstone from Huntington Belt into Shropshire, where (said Mr. Bowkley) the coal beds again appear at the surface, having been uplifted from their original position by the same agency, and at the same time as the South Staffordshire coal field, and leaving the same rocks exposed on the edges of the coal field, with the coal measures reposing on the same limestone as they do in South Staffordshire. Alluding to the district lying between Huntington Belt and a point a little past the turnpike road leading from Cannock to Penkridge, about three-quarters of a mile westward of the belt, Mr. Bowkley said he belived the coal measures were sure to exist there, and at no very great depth below the surface; and a well-selected spot between these points would be a proper place to sink to get coal, and with, he believed, a certainty of finding it. Standing near Kinvaston, and looking at the low and level character of the country to Shifnal, united with the testimony of geological facts, Mr. Bowkley said he was decidedly of opinion that these coal beds had never been disturbed, but lay there upon the Silurian limestone, and covered over by the New Red Sandstone formations, which were in their proper places and positions. Looking at all the circumstances, no doubt whatever remained on his mind that the coal measures not only existed between Kinvaston and the point referred to between Cannock and Penkridge, but lay at an easily workable depth below the surface, and that a great part would probably be of the same character as the Cannock Chase mines. If the depth to these mines was greater than on the coal field this would be found to be of little consequence, as science would provide all the necessary appliances for raising the mines as profitably as where the depth was less; besides, as the distance between the pits would be probably great, the mines would be gotten and the bulk of the land still retained for agricultural purposes. Answering questions often asked, Mr. Bowkley expressed his opinion that the difference of thickness in the same beds of coal is due in a great measure to local causes, and that the difference in the distances between the beds is attributable mainly to the varied amount of subsidence while the deposition of the coal measures is going on in different places, even at no great distance apart. In conclusion, Mr. Bowkley said: It seems to me very clear that the coal beds were deposited upon the Silurian limestone, which had previously been elevated, and had thrown off its covering of Old Red Sandstone and Carboniferous Limestone if they ever were deposited on it, of which there is no evidence. Whilst the coal measures were in course of deposition there were one or two eruptions of trap rock, which was intrusive and much disturbed, and deteriorated the coal measures. After the coal measures were deposited, and were covered over by the Permian rocks and the New Red Sandstone formation there was another upheaval of the Silurian limestone, which dislocated the coal measures and threw them up above the surface, and the covering of New Red Sandstone was thrown off, denuded and scattered, as well as part of the coal measures themselves; indeed, the Silurian limestone itself has been thrown up to the surface in each of these coal fields. I feel that my deductions from these facts are correct, because upon no other theory can the existence of these coal fields be explained, and the geology of the districts supplies the facts which prove the theory, every practical test pointing most unquestionably to its truth. I am therefore of opinion that the coal measures now lie undisturbed under the New Red Sandstone of the midland counties, and that, so far from our coal fields being exhausted we are only just beginning to discover them. (The paper, which was illustrated by maps and sections, was received with applause.)

The PRESIDENT remarked that the paper which had just been read was, no doubt, one of theory. It looked very pretty on the map, and he supposed he might assume that Mr. Bowkley intended it to stretch from Rugeley to Stourbridge. (Mr. BOWKLEY: "Yes.") Well, that opened one of the greatest fields, in a geological sense, in a district like that which could possibly be brought before their Institute. He presumed Mr. Bowkley had got the information on which the paper was based from Cannock Chase, and if his theory should be borne out in that district there was no reason why it should not be carried out all the way to Stourbridge. In that case he should quite agree with Mr. Bowkley that they had only just begun their coal fields. For his part, however, he was not quite so sanguine as Mr. Bowkley, but there was one thing that no longer remained in doubt—that the present known and developed coal fields of this district were fast drawing to a close. Unquestionably the enquiries of the Royal Coal Commission would show that a large quantity of various thicknesses remained to be got, and when he said that the supply was drawing to a close—and he said it without fear of contradiction—he meant that quality of coal which was required for our iron manufacture. The President then asked for any information possessed by any member present as to the existence of the New Red Sandstone, the Carboniferous, the Old Red Sandstone, and the Silurian rocks which, he said, had an important bearing on the question discussed in the paper, and he tendered the thanks of the meeting to Mr. Bowkley, remarking that whether they coincided with or differed from the views he had expressed they could not fail to see that Mr. Bowkley had devoted a great deal of labour to his task. The President recommended that the discussion should not be concluded that day, as the subject was of vital importance, not only to the trades of the district, but also to the owners of property.

Mr. BECKETT said he accompanied Mr. Bowkley in his examination of the district, and fully concurred in his views.

Mr. D. JONES thought most of them believed, with Mr. Bowkley, that between the two great districts of Staffordshire and Shropshire there was originally one great coal field deposited, but there was unmistakeable evidence on the Shropshire side of denudation anterior to the period of the coal measures. The extent of that denudation was not, however, at present ascertained, but it was quite certain, whatever its extent in an eastern direction might be, that it did not extend to South Staffordshire. In the Great Western boundary fault there was such undoubted evidence of a mere dislocation letting down the coal measures that there could be no question that, by means of a bore-hole or shaft, the coal measures would be met with.

Mr. S. BAILEY alluded to the excitement created by Sir W. Armstrong's opinion as to the early failure of our coal supply, and remarked that the report of the Coal Commission would satisfy the public that there was no necessity for alarm respecting the exhaustion of our coal fields for centuries to come. In reference to the local coal fields, he was of opinion that most probably coal would be found far beyond the present known limits, north and east also. His opinion was strengthened in regard to the district between this and the Warwickshire field by the fact of regular coal seams having been found and worked to some considerable extent in the direction of Warwickshire, under the New Red Measures, and again from workings under his own superintendence in that county, where the coal under the Red Measures dipped at an angle of 1 in 6, then becoming flatter in this direction, from which facts the inference might be drawn that coal existed between this district and Warwickshire to a considerable extent, if not all the way, though it might be broken here and there by faults. This was confirmed by the investigations at Sandwell, and by the sinkings, under his superintendence, at Wigmore. In reference to the character of the western boundary fault, he might say that he worked up to it five or six years ago, under Mr. Vernon, and he and Mr. Beckett suggested that the owners of property should take the opportunity of proving it, but that was not done. A heading was, however, driven into it for a short distance, which proved the ground to be much disturbed, and then a decided dislocation was met with at an angle of from 50° to 70°. His opinion was that the fault at this point was a dislocation westward of some considerable extent. The West Cannock sinkings proved that the coal measures were not cut off by this fault, which was formerly supposed to extend in the direction of Cannock and Rugeley, but missed, probably, to some extent, and joined other coal fields. He could not doubt that the coal field would extend, and rapidly developed, under the New Red rocks on the other side of our coal field. (Cheers.)

In answer to the Chairman, Mr. BOWKLEY said he calculated, as an approximate estimate, that the depth of the first coal at Wheaton Aston would be from 400 to 500 yards.

Mr. W. NESS, being asked for his opinion on the paper, said he was a stranger to the neighbourhood, but from what observation he had been able to make he believed the coal measures were lying intact, as described, unless there was a process of denudation going on prior to the deposit of the New Red Sandstone.

Mr. HOMER said the upper measures were often found to die away altogether, and if that were the case in the district under consideration, it would bring the coal measures much nearer the surface than Mr. Bowkley estimated.

The discussion was then adjourned.

Mr. DANIEL JONES next brought before the meeting a scheme for proving and working the mines west of those already proved at Hednesford. He said that on Oct. 14 last he laid before Lord Hatherton a proposition for leasing about 1000 acres of his property, which he considered to be favourably situated for a trial sinking. It comprised nearly the whole of the township of Huntington, the eastern boundary of which abutted on the mineral estate of the West Cannock Colliery Company, which had been proved down to the shallow coal by shafts now being sunk, and there was no doubt that the deep coal would be met with in its proper place. It was also shown by these pits that there was a gradual dip of the coal measures towards Huntington, and he had no hesitation in saying that this West Cannock Colliery, considering its extent and the regularity of the measures already proved, would shortly be one of the finest coal properties in South Staffordshire. Finding that his lordship was not indisposed to consider the suggestion he, (Mr, Jones) mentioned that this Institute would offer very valuable assistance in bringing it to a practical result. With that view Lord Hatherton invited the President, Messrs. Beckett, Bowkley, and Cope to look over the property, and the result, which was very favourable, was to a great extent embodied in Mr. Bowkley's paper. A site had been selected for a trial shaft, and he (Mr. Jones) had arranged the preliminary terms of a lease much upon the principle adopted in the Sandwell Park scheme. The term would be 53 years, including three years given for carrying out the test, which was to be made by sinking a shaft or shafts; the sum of 16,000*l.* to be expended in making the trial, if necessary; the royalty on coal, slack, and fire-clay, 6d. per ton; ironstone, 1s. per ton; bricks, 1s. per thousand. The surface of certain of the lands might be used for colliery purposes, the rent being 60s. per acre per annum; the minimum rent was, for the fourth year, 1000*l.*; fifth, 1500*l.*: sixth, 3000*l.*; seventh, 4000*l.*; and 4000*l.* per annum as long as the colliery was capable of producing it. There was provision for making a canal or railway over property of Lord Hatherton, by which communication could be made with the Staffordshire and Worcestershire Canal and the London and North-Western Railway. Mr. Jones said the only objection he had heard raised was that the scheme was not speculative enough—that the property was situated adjacent to a proved coal property, and the sinking of a shaft was so certain to hit the coal measures that it left still open the question of coal existing in the district lying between Shropshire and Staffordshire. He asked the opinion of the meeting as to the desirability of organising a limited liability company for putting the scheme in operation, and said he proposed, if approved, to launch the scheme under the patronage of the South Midland Institute of Mining Engineers.

The PRESIDENT remarked that he was barred by Act of Parliament from interfering in the scheme, but he might remark that he thought, from the description given by Mr. Jones, that it was worthy the attention not only of the Institute, but also of the whole country. The project was a favourable one, which they might think of, and, he hoped, eventually join in. The meeting had the opportunity of embarking in the scheme if they thought fit.

Mr. D. JONES said his object in bringing his scheme before the Institute was that they might ally themselves with it, if they thought fit, in the same way as the Dudley Institute has done with the Sandwell scheme.

Mr. COPE stated that he had examined the ground himself, and considering the extent of ground and facilities for communication, he had no doubt of its being a legitimate concern. He did not think the time was far distant when there would be a prospect of seeing some "black diamonds" coming up. He should join the scheme himself.

Mr. BECKETT thought it the duty of the Institute to take the matter in hand. He would suggest that a committee be appointed to get a company formed without loss of time.

Mr. H. UNDERHILL, as a visitor that day, and as one interested in the scheme with Mr. Fowler (solicitor) and Mr. Jones, suggested that the committee should be composed of mine agents and commercial gentlemen, recommending that the names of Mr. S. York and Mr. Smith (Shifnal) should be put down among the latter. After such a committee had considered the scheme, he thought there would be no difficulty in pushing it, if it should turn out to be one of those fair and legitimate speculations which every person in the district was desirous of carrying into effect, knowing how beneficial it would be to the district and everybody interested in it, that every possible coal bed within a reasonable distance of South Staffordshire should be developed. (Hear, hear.)

Another MEMBER said the scheme strongly commended itself to the Institution, for it was hardly a speculation; it would be a positive fact. They had only to sink down and it would prove remunerative. Yet it would hardly prove whether coal existed between Staffordshire and Shropshire; for that they would have to go further westward.

Mr. W. NESS also decidedly approved of the scheme from what he had seen in the neighbourhood.—Mr. BARKER said he had his doubts whether coal existed over the whole of the area proposed to be leased.

A committee was then formed, consisting of Messrs. S. York, Barker, Smith, Beckett, Blakemore, S. Bowkley, T. Rose, J. C. Homer, M. Ironmonger, F. C. Perry, W. Ness, J. Cope, and D. Jones, and the meeting separated.

## SOUTH STAFFORDSHIRE AND EAST WORCESTERSHIRE INSTITUTE OF MINING ENGINEERS.

An ordinary meeting of the members was held on Monday, in the Dudley and Midland Geological Museum, Dudley. The President, Mr. Joseph Cooksey, occupied the chair, and the following gentlemen were also present:—Messrs. W. Spruce, J. Hughes, T. Checkley (Vice-President), G. Spruce, J. M. Fellows, T. Oakes, J. Williams, G. Taylor, J. Ritson, I. Morgan, I. Williams, W. Turner, W. Hayward, E. Smallman, J. Cole, J. M. Fellows, R. Latham, F. Holcroft, E. Greenway, and many others.

The principal business of the evening was a conversational discussion upon the new Mines Regulation Bill, now before the House of Commons. The members were unanimous in agreeing that the age of boys, where mentioned in the Act, should be twelve instead of thirteen years, and they strongly condemned the clause at the end of section 21, which says, "In the event of any contravention of or non-compliance with any of the said regulations in the care of any mine by any person whomsoever, the owner or agent of such mine shall be guilty of an offence against this Act." The introduction of the word "whomsoever," they thought, rendered the clause particularly oppressive. Other objections were made and suggestions offered, but it was found that the meeting was too large to discuss the question thoroughly, so that the whole matter was referred to the Council of the Institute, to report upon it to the members. In order that this might be done before the bill was sent into committee, it was determined that a council meeting should be held on Friday evening. The President, Mr. Checkley, Mr. Hughes, and Mr. Spruce pointed out that there were one or two members of the Mining Association of Great Britain in the district—namely, Mr. J. P. Hunt, Mr. E. F. Smith, and Mr. Hartley—all of whom might assist them by laying the objections of the Institute before the persons in London most likely to bring about the desired changes.—Mr. Checkley suggested that the hon. secretary should invite Mr. Duignan (Duignan, Lewis, and Co.) to the council meeting on Friday evening, and that in the meantime all possible information should be obtained from Mr. Maskell Peace, the secretary of the Mining Association, for the guidance of the members. After a discussion, this suggestion was put in the form of a resolution, and carried unanimously. Mr. Frederick Parkes, of Birchills Hall Colliery, Bloxwich, coalmaster, was elected a member.

## FOREIGN MINING AND METALLURGY.

The conclusion of peace having become an accomplished fact a much more cheerful feeling has prevailed in the Belgian coal basins. This is not to be wondered at, as the cessation of the war implies for Belgian coal owners a definitive revival in affairs, and a singular period of activity. Belgium will, perhaps, profit more than any other nation—that is, relatively—from the new order of things, since France is certain to purchase very large quantities of Belgian coal. French coal mining industry can scarcely be expected to revive all at once, since after it has suffered cruelly from want of labour for seven months matters are not likely to resume instantaneously their normal course. But whatever the future may have in store, orders flow in for the present from all parts and for all kinds of coal; rolling stock on the railways does not make default so much as hitherto, and navigations are generally open. The extraction of Belgian coal will, then, in all probability, be carried to the utmost possible limits, as the stocks at the pits' mouths will have soon disappeared. The orders for coal received in Belgium from Holland and Germany are numerous, and this state of things seems likely to continue for some little time longer, as the German troops will be only gradually withdrawn from France. Allusion was recently made to the letting of contracts for the coal required for the Belgian State Railways. The adjudication seems to have been attended with some complaints. Thus, it is alleged that the importance of each lot was too considerable, and it has been argued that it would be better both for Belgian coal mining industry and also for the State if the lots offered for contract were more numerous, and of less importance, as there would be more tenders delivered. A French company has been actively opening out of late a new colliery on the Fiesteaux de Couillet. The Bois du Caziers Company has also opened out a colliery in the Haies de Marcinelle; the company is endeavouring to unite the colliery to the Belgian State Railways at the Couillet station.

The Belgian iron trade displays from day to day a growing tendency to increased activity; the conclusion of peace is expected to give a sensible impetus to production. The Marcinelle Metallurgical Company is about to light a new furnace, which it has just built. We have noted from time to time that several works had increased their means of production, and this example will, in all probability, be followed by others. The Western Bohemia Railway Company has put in force a reduced tariff for rails and other railway *materiel* of Belgian manufacture. This policy is expected to sensibly extend the consumption of Belgian products in Bohemia.

It appears from official data that the quantity of unworked iron imported into Russia in the first eleven months of last year was 1,736,278 poods, as compared with 1,818,534 poods in the corresponding period of 1869; of iron in bars, rolled and worked iron, and old iron, 2,905,680 poods, against 1,608,734 poods; of plates for armour plating, boilers, &c., 844,724 poods, against 736,417 poods; of rails, 13,735,789 poods, against 11,783,902 poods; and of locomotives and machinery, 2,251,868 poods, against 1,752,684 poods. The importation of rails into Russia has made great progress, but it should be remarked that the Russian Government, in the new railway concessions which it grants, inserts in the concessions clauses requiring that a great part of the rails used should be manufactured in Russia itself. At present, however, Russia cannot meet her rail requirements, and the Russian Government recently authorised the importation of 1,700,000 poods of rails, duty free, for the Kiew and Brest and the Schouia and Ivanovo lines.

At Havre, Chilian copper has been comparatively quiet; some lots have changed hands at 66*l.* per ton, Paris conditions; one lot of 30 tons was even sold for 67*l.*, but this latter price was only obtained because the copper in question was of a superior mark. At Marseilles, Toka has been quoted at 80*l.*; refined Chilian and Peruvian at 80*l.*; rolled red copper in sheets, 84*l.*; and round ditto, 84*l.* per ton. The German copper markets present a more favourable aspect; transactions begin to become more animated, and deliveries can be made more regularly. At Hamburg, in consequence of rather numerous transactions, stocks have been considerably reduced, and it is stated that fresh arrivals would be well received. At Rotterdam, Drontheim has made 50 fls. to 52 fls. The German tin markets have been generally well maintained; some rather important arrivals have provided for the requirements of consumption, and have naturally exerted some influence on prices; nevertheless, a good demand still prevails. The next sale of tin by the Dutch Society of Commerce will take place on March 30, and will comprise 80,800 ingots of Banca. The direction gives an assurance that before the autumn of 1871 it will make no other sales in Holland, while the Government will have no sales in India. Recent quotations of Banca have been 77⅛ fls. to 77⅜ fls. Scarcely anything has been passing in Billiton, of which there have been hardly any supplies. Lead has generally displayed a firm tone; at Hamburg, however, it has attracted comparatively little attention. The German zinc markets have displayed more activity. At Hamburg, for instance, the demand has shown more animation.

THE TIN TRADE.—Mr. L. Th. van Houten (Rotterdam) writes—The Dutch Trading Company has this day fixed the spring sale of Banca tin to take place in Amsterdam, on March 30, when 80,800 slabs will be brought forward, in lots of 100 slabs. The directors further give notice that no tin will be brought in the market by them before the autumn sale this year; also that till this period no Government sales of Banca tin will take place in the Dutch East Indies, and that no shipments of this metal will take place from the East Indies to China for Government account. The above engagement does not apply to tin belonging to other parties. The catalogues, with the conditions of sale, will be issued in due time. We have to report a very quiet market for tin during the whole month, and only very slight fluctuations have taken place in the value of the article. Banca tin was sold at 77¼ fl. in the beginning of the month, and when somewhat more demand had set in, on the opening of the navigation, the price advanced to 78 fl. The English market remained quiet, with rather drooping prices, considerably lower than our quotations here, and the demand again fell off towards the end of the month, the nominal closing price being again 77½ fl. In Billiton tin very little has been doing, the stock on the spot having previously all been sold, and the parcels on ship board arrived during the winter not yet being discharged. In parcels afloat no business has come to our notice. We quote to-day 77 fl. ex ship arrived, and 76 fl. for floating lots. A public sale of 6000 peculs Billiton tin was held at Batavia on Feb. 6, which went off at 80·42 fl. per pecul, equal to about 74¾ fl. ex ship here. The combined delivery of tin during this month has again been very satisfactory, being 11,400 slabs, notwithstanding the interruption in the navigation by the severe winter. The following statement shows the position of Banca tin in Holland on Feb. 28, from the official returns published by the Dutch Trading Company—

| | | 1871. | 1870. | 1869. |
|---|---|---|---|---|
| Import in February ..... | Slabs | 7,413 | 2,839 | 8,406 |
| Total two months ..... | | 17,770 | 16,068 | 15,125 |
| Deliveries in February ..... | | 11,400 | 6,173 | 11,101 |
| Total two months ..... | | 21,800 | 19,473 | 28,601 |
| Stock second-hand ..... | | 49,100 | 43,375 | 67,472 |
| Total stock ..... | | 146,949 | 120,243 | 127,797 |
| Stock of Billiton ..... | | 5,151 | 7,591 | 3,023 |
| Import in February ..... | | 728 | 4,491 | 5,035 |
| Delivered & shipped in February.. | | — | 4,400 | 2,800 |
| Quotation Feb. 28 | Banca ..... | 77½ fl. | 69½ fl. | 76½ fl. |
| | Billiton ..... | 77 | 67½ | 75½ |

These returns, compared with those of 1870, exhibit—An increase of the import for February of 143 tons, an increase of the deliveries for the two months of 53 tons, an increase of the deliveries for February of 163 tons, an increase of the stock of 179 tons, an increase of the unsold stock of 656 tons, an increase of the total stock of 835 tons, and an advance of the quotation of Banca equal to 13*l.* 6s. per ton. The quantity of Banca tin now afloat for the Dutch Trading Company is 1025 tons, against 2156 tons last year. We estimate the quantity of Billiton tin now afloat at 700 tons, against 614 tons last year. The Government returns for month of December are as follows:—

EXPORT OF TIN FROM HOLLAND.

| | December. | | | Twelve months. | | |
|---|---|---|---|---|---|---|
| | 1870. | 1869. | 1868. | 1870. | 1869. | 1868. |
| Germany ..Tons | 187 | 207 | 218 | 2319 | 2294 | 2348 |
| England ..... | 326 | 282 | 544 | 1886 | 1184 | 1349 |
| Belgium ..... France ..... | 86 | 267 | 298 | 1788 | 2142 | 2137 |
| Hamburg ..... | 23 | — | 17 | 134 | 111 | 244 |
| United States .. | — | — | 37 | 89 | 18 | 127 |
| Othercountries.. | 23 | 8 | 12 | 367 | 310 | 364 |
| Total ..Tons | 645 | 764 | 1126 | 6583 | 6059 | 6569 |

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